## Federal Energy Management Program







# **Streamlining EPSCs** for Small Sites



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Sam Espinosa, Energetics, Inc.

FEMP Expert: Chip Goyette, Federal Energy Management Program





## **Core Competencies Addressed in this Seminar**

#### **Energy/Sustainability and Facility Managers**

**Building Technologies** 

**Commissioning Process** 

**Energy Analysis** 

Investigative Skills

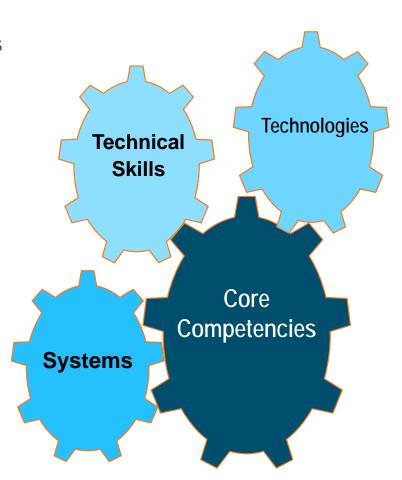
Measurement and Verification

Benchmarking and Metrics

#### **Operating Engineers/Building Technicians**

**Building Systems** 

Operations and Maintenance





# Results / Expectations

Use the Energy Savings Performance Contract (ESPC) ENABLE program to install *targeted ECMs* such as

- lighting
- water, and
- HVAC controls

in facilities smaller than 200,000 square feet and within a six-month timeframe.

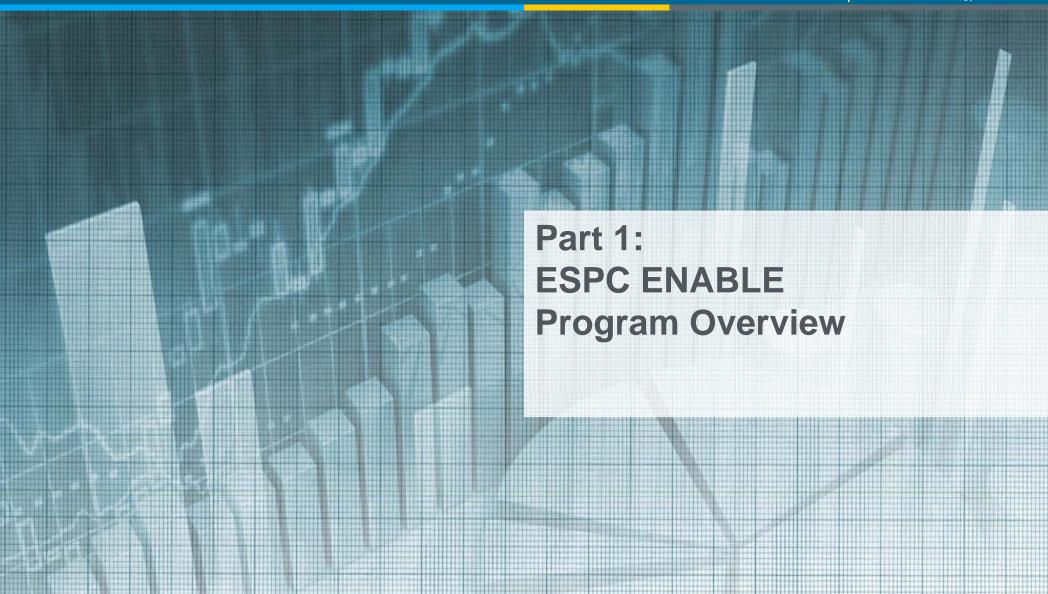




## Agenda

- ESPC ENABLE Program Overview
- ESPC ENABLE Step-by-Step Process
- Getting Started







ESPCs allow Federal agencies to procure facility improvements with no up-front capital costs and are paid for over time.

**ESCO** 

- Incurs cost for implementing project
- Guarantees cost savings, equipment performance, standards of service

Agency

 Pays ESCO over term of contract from energy cost savings



# **ESPC Key Points**

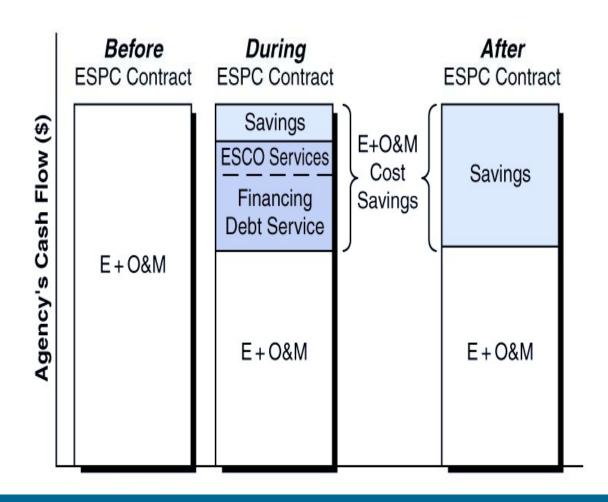
- Savings guarantees are mandatory
- Savings must exceed payments in each year
- Measurement and verification (M&V) is mandatory
- Contract term cannot exceed 25 years





## **ESPC Payments**

- Key: ESPCs are budget neutral
- ESPCs are paid from savings – guaranteed





## **ESPC ENABLE**

- Intended for Federal facilities under 200,000 square feet
- Provides a standardized and streamlined process using GSA Schedule 84
- Targets straight-forward ECMs including lighting, water, and controls
- Includes basic levels of measurement and verification (M&V) for each ECM



NOAA Norfolk Federal Building



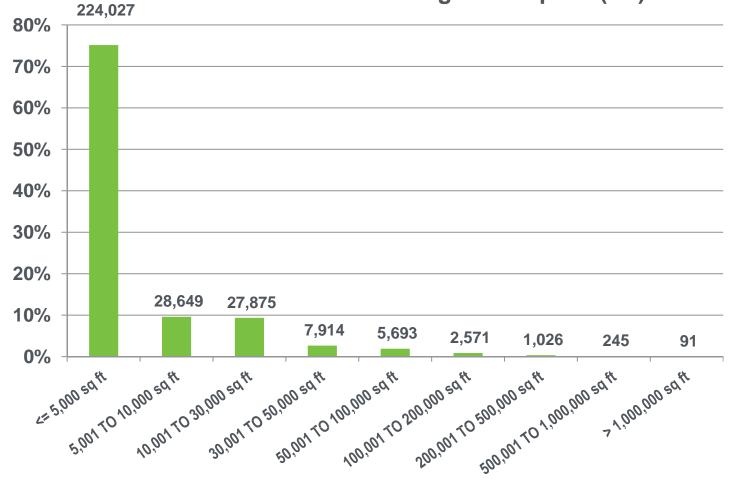
# **Setting the Stage: Why ESPC ENABLE?**

- Increased requirements for energy efficiency and water conservation in Federal facilities
- Lack of appropriated funds to complete energy efficiency and water conversation projects
- Traditional project funding tools are not serving small, Federal installations



FRPP: All Federal Building Floor Space (ft.2)

99% of all Federal buildings are under 200,000 sq. ft.



Source:: GSA Federal Real Property Profile (FRPP)



### **Market Potential**

- Approximately 2 billion sq. ft. compose the target market for ESPC ENABLE projects
- At an average annual energy expense of \$2.00/sq. ft., these buildings account for \$4 billion annually in energy expenses
- If ESPC ENABLE projects aim to capture an average of 20% savings within a 5-10 year simple payback range, an estimated \$4 - 8 billion in potential project savings



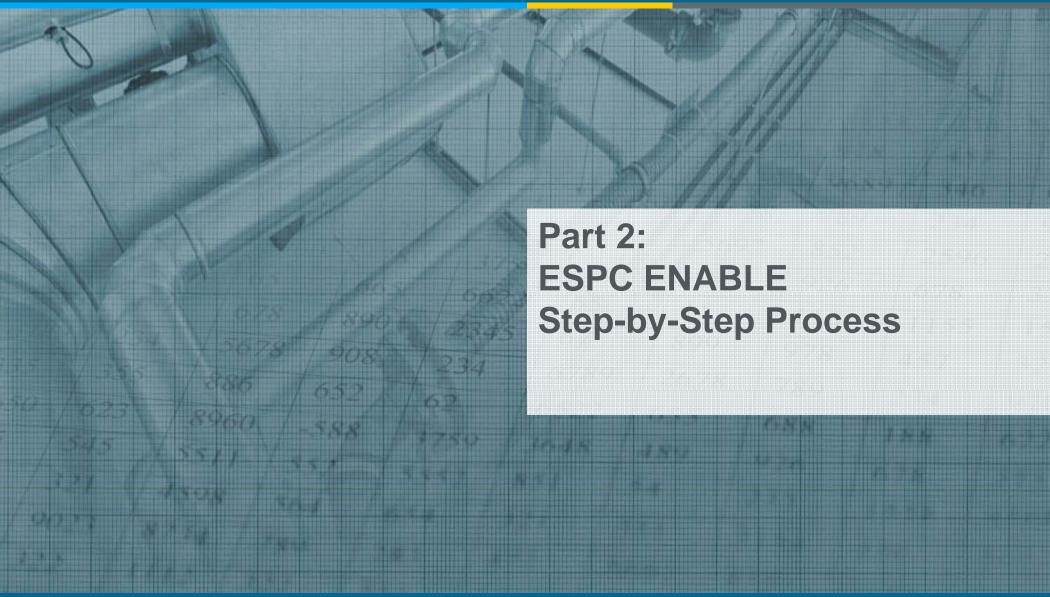
## **ENABLE Program Benefits**

- Streamlined selection and acquisitions process using a proven contracting method
- Standardized tools and contract templates to speed the award process
- Extensive technical support, particularly in the pilot phase, to ensure project success
- Energy savings realized in a short period of time
- M&V appropriate for project size and scope





	ESPC ENABLE	
Contract Vehicle	DOE ESPC IDIQ Contract	GSA Schedule 84 (SIN246-53)
Contract Term	Up to 25 Years	Up to 25 Years
Target Market	Unlimited	Small, federal facilities (~200K square feet)
Energy Conservation Measures	Unlimited (Includes renewables)	Lighting, Water, and Controls
Average Cycle	12-20 Months	12-15 Weeks (Anticipated)
Average Project Size (\$)	\$14M	\$500K-\$1M (Anticipated)
Average Contract Term	16 years	5-10 Years (Anticipated)
Required Project Facilitator (PF)	Yes	No
Prescribed (M&V)	Yes	Yes





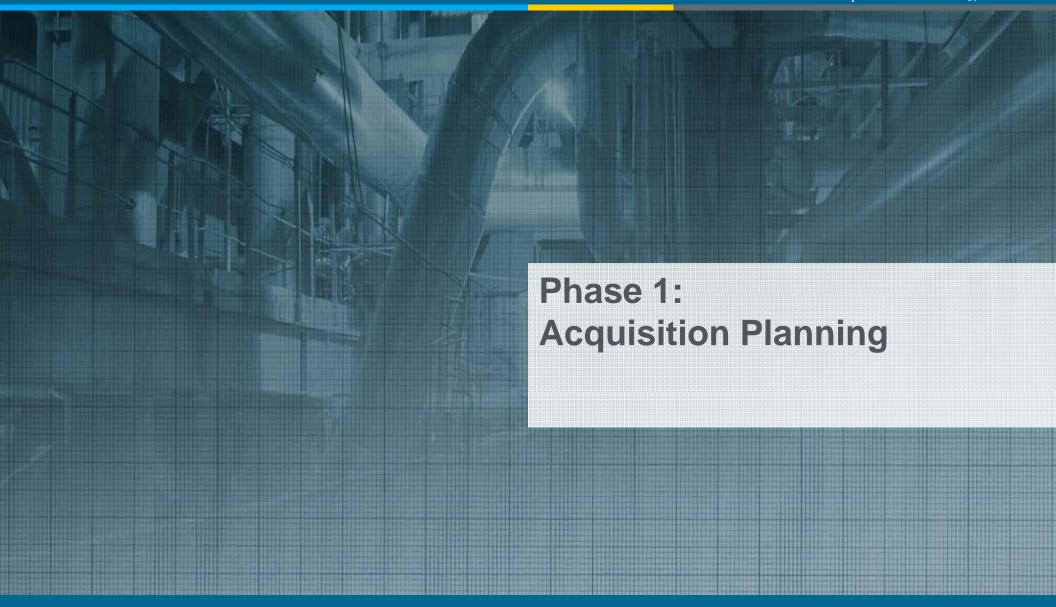
## **ESPC ENABLE Phased Approach**





## **ENABLE Contract Document Templates**

- Acquisition Plan
- Request for Quotation (RFQ)/Notice of Opportunity (NOO)
- ESCO Expression of Interest Form
- ESCO Evaluation Form
- Notice of Intent to Award (NOITA)/Letter to Unsuccessful Offerors
- Survey Tools for Investment Grade Audit (IGA)
- Scope of Work (SOW)
- Measurement & Verification (M&V) Protocol and Template





# Acquisition Planning

#### **Activities: Estimated timeline - 1-2 Weeks**

- Essential members of the acquisition team are identified
- Agency hosts kickoff meeting with acquisition team members
- Agency develops an Acquisition Plan\*
- Agency develops the Request for Quotation/Notice of Opportunity\*

\*Indicates FEMP-provided template



Acquisition Planning

## The Acquisition Plan:

- Defines an organizational structure for the project
- Includes a checklist for significant milestones



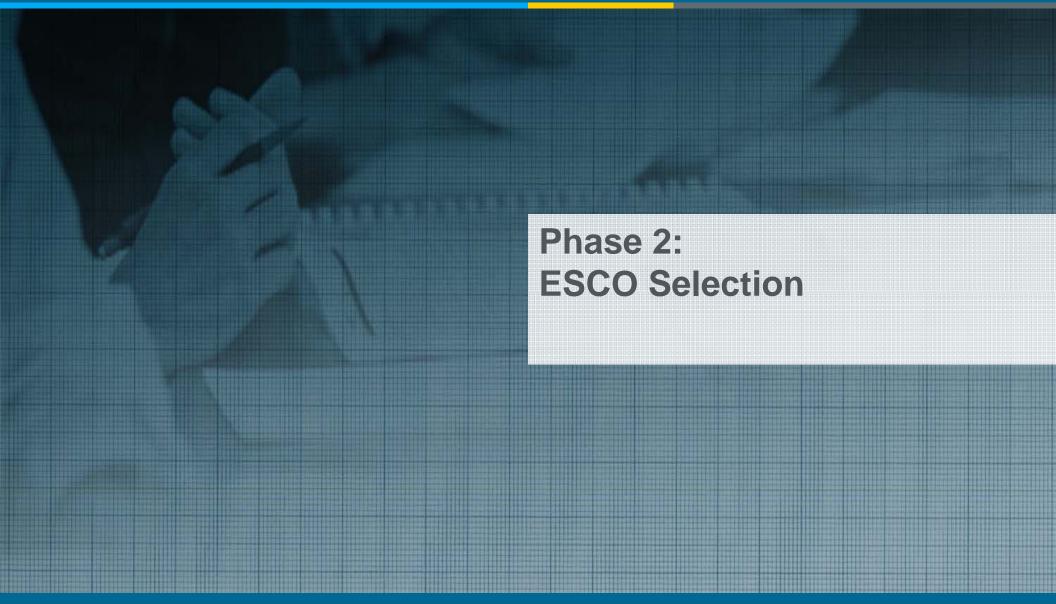


# Acquisition Planning

After acquisition plan, agencies prepare a Notice of Opportunity (NOO)/Request for Quotation (RFQ) to be sent to eligible contractors

#### Content includes:

- Agency Name
- Location and description of Project Site
- Definition of Scope
- ESCO Selection Process and Evaluation Criteria
- Facility Information
- Facility Energy Data





ESCO Selection

#### **Activities: Estimated timeline - 3 Weeks**

- Request for Quotation/Notice of Opportunity is released
- ESCOs express interest
- Agency evaluates responses based on best value criteria outlined in the RFQ/NOO\*
- Agency notifies unsuccessful offerors and issues the notice of intent to award (NOITA)\*

\*Indicates FEMP-provided template



ESCO Selection

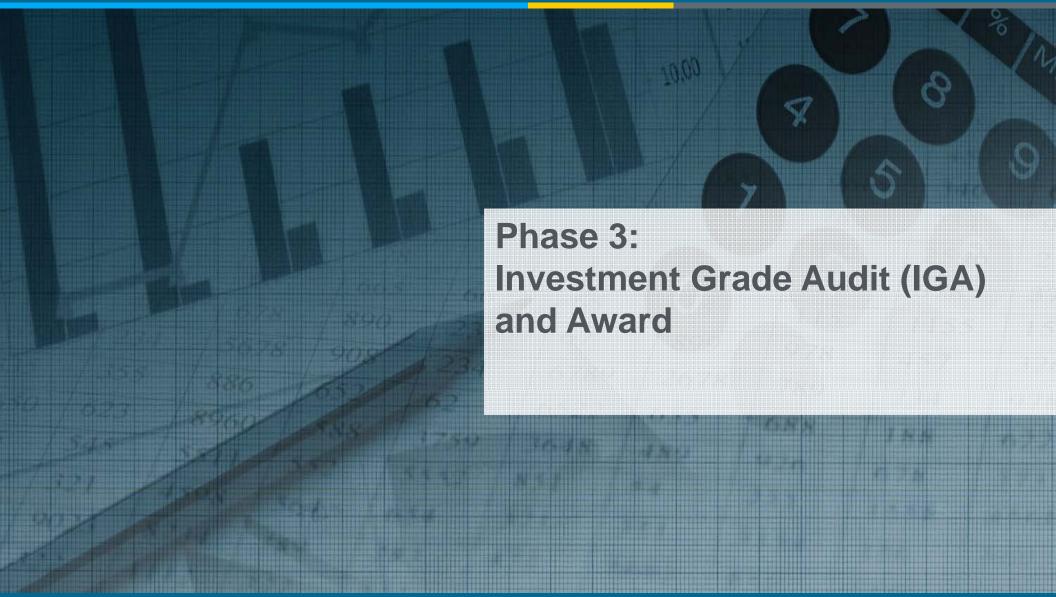
- ESCOs are required to respond to the Notice of Opportunity using the ESCO Expression of Interest Template within one week.
- Each member of the agency acquisition team evaluates energy service company (ESCO) submissions using pre-established proposal evaluation procedures.



### ESCO Selection

- Following the selection of an ESCO, the FEMP-provided template letter may be used to notify unsuccessful offerors
- The agency issues a Notice of Intent To Award (NOITA) the Investment Grade Audit (IGA) to the successful offeror

# **BREAK**





IGA and Award

#### **Activities: Estimated timeline - 3 Weeks**

- ESCO performs
   Investment Grade Audit (IGA)\*
- ESCO submits final proposal, final negotiations occur
- Agency awards task order

\*Indicates FEMP-provided template



## **IGA** (Investment Grade Audit)

- Site visit to identify opportunities for savings
- Gather data to establish baseline conditions
  - Agency to witness measurements
- Basis of formal savings proposal to agency

#### **FEMP Provided Audit Tools**

- ESCOs required to use FEMP audit tools in IGA
- Provides standard approach to establishing baseline and calculating savings, minimizes agency technical review



#### **ENABLE ECMs**

IGA and Award

- Lighting
  - Lamps, ballasts, fixtures
  - Lighting Controls (occupancy, day lighting)
- Water
  - Plumbing fixtures
     (sink, toilet, urinal, shower, etc.)
- Simple HVAC Controls
  - Time/Temperature setback
  - Demand and night ventilation

Not included: HVAC replacement, advanced building controls



#### **FEMP Audit Tool**

IGA and Award

## Water and Lighting:

 Excel based spreadsheet tool calculates energy and cost savings based on pre/post fixture data, usage, energy/water costs, etc.

#### **HVAC Controls:**

 Tool utilizes a simulation program (EnergyPlus) running in the background to calculate pre and post energy consumption and returns data to spreadsheet

Tool Outputs: Form the basis for contract documents

Tool auto-generates summary data tables and audit findings



# **Audit Tool: Lighting**

- Room-by-room audit, full inventory lighting equipment
- Calculates energy and cost savings with embedded formulas comparing baseline and proposed conditions
  - Current equipment (watts), usage (hours), electricity σ
     (ψ)
  - Proposed equipment (watts), usage (hours), electricity cost (\$)
    - Includes changes in usage when utilizing lighting controls
    - Includes adjustments for interactive HVAC effects
- Auto-populates tables for proposals/M&V plan





# Lighting: Audit Tool Worksheet & Equipment Master List

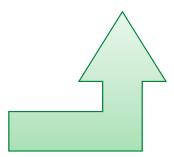
ESCO generates Master List of pre- and post-equipment

- Equipment appears in "pull-down" menus on audit tool worksheet
- Audit tool worksheet is auto-populated with data from master

#### **Equipment Master List**

- Equipment Data
- ID as Pre-Existing or Retrofit
- M&V Data Inputs
- Unit Cost Inputs

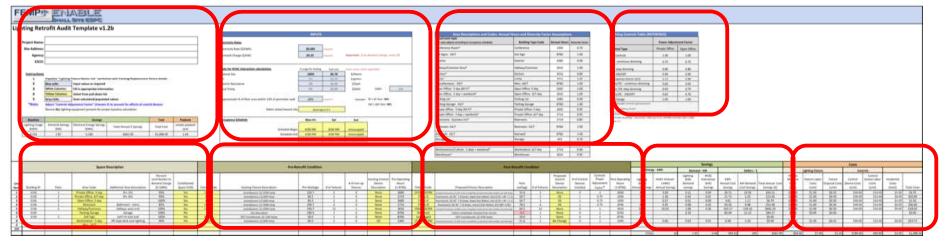
Audit Tool Worksheet





# **Audit Tool – Lighting - Overview**

1. Project Info, 2. Energy Cost/ 3. Usage 4. Controls Summary Totals Schedule Inputs Group Table Table



- 5. Space Description
- 6. Pre-retrofit Inputs
- 7. Post-retrofit Inputs
- 8. Savings Outputs
- 9. Fixed cost Outputs

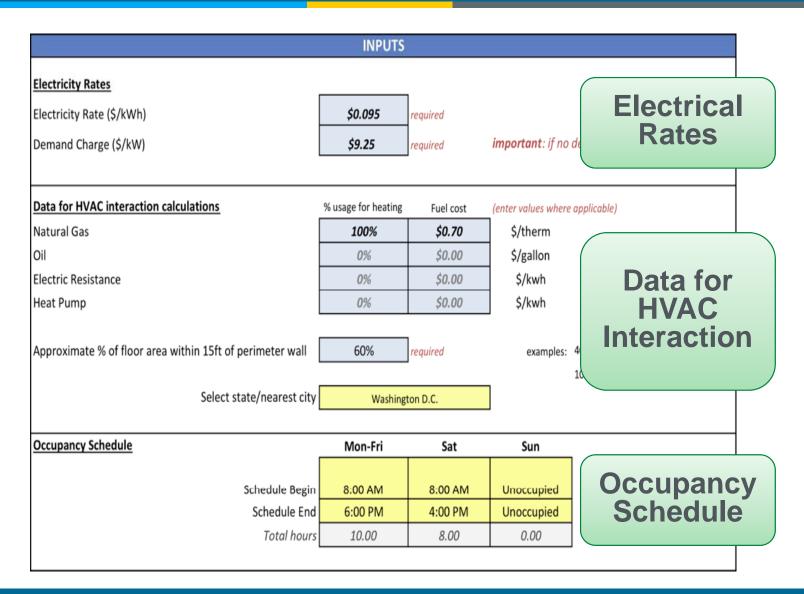
### FEMP First Thursday Seminars



FEMP	SIMIAL					
Project Name:	rofit Audit	Template v1.	Project Information			
Agency: ESCO:						
Instructions 1 2 3		Fixture Master List" worksh Input values as required Fill in appropriate inform	Instructions			
4 5 *Note:	Yellow Columns: Gray Cells: Adjust "Controls Ad	Select from pull-down list Auto-calculated/populate				
		equipment present for prop	Savings Summary			
Baseline Lighting Usage (kWh)	Demand Savings (kW)	Savings  Electrical Energy Savings (kWh)	Total Annual \$ Savings	Cost Total Cost	simple payb	Summary
8,254	1.87	5,196	\$662.90	\$1,088.00	1.64	

#### FEMP First Thursday Seminars





## FEMP First Thursday Seminars



Area Descriptions and Codes: An	nual Hours and Diversity Fact	or Assumption	ns		
Area/room type (*= auto adjusts according to occupancy schedule)	Building Type Code	Annual Hours	Diversity Factor		
Conference Room*	Conference	1300	0.70		
Exit Signs: 24/7	Exit Sign	8760	1.00		
Exterior	Exterior	4380	0.00		
Hallway/Common Area*	Hallway/Common	3016			
Kitchen*	Kitchen	3016	Heere	Croup	
Lobby*	Lobby	3016	Usage	Group	
Miscellaneous - 24/7	Misc: 24/7	8760	Codes		
Open Office: 5 day (M-F)*	Open Office: 5 day	2600			
Open Office: 5 day + weekend*	Open Office: 6/7 day	3016	Establishes:		
Parking Lot	Parking Lot	4380	• Area	2	
Parking Garage: 24/7	Parking Garage	8760	Ale	a	
Private Office: 5 day (M-F)*	Private Office: 5 day	2600	• Ann	nual hours	
Private Office: 5 day + weekend*	Private Office: 6/7 day	2714	7 (111)	idai iiodio	
Restrooms: business hrs*	Restroom	2714	<ul><li>Dive</li></ul>	ersity Factor	
Restroom: 24/7	Restroom: 24/7	8760			
Stairwell: 24/7	Stairwell	8760	1.00		
Storage	Storage	603	0.70		
Workstations/Cubicle: 5 day (M-F)*	Workstation: 5 day	2340	0.90		
Workstations/Cubicle: 5 days + weekend*	Workstation: 6/7 day	2714	0.90		
Warehouse*	Warehouse	3016	0.95		

#### FEMP First Thursday Seminars



#### **Lighting Controls Table (REFERENCE)**

	Power Adjustment Factor				
Control Type	Private Office	Open Office			
No Controls	1.00	1.00			
DC - continous dimming	0.75	0.75			
DC- step dimming	0.80	0.80			
DC -ON/OFF	0.90	0.90			
Occupancy Sensor (OS)	0.75	0.88			
OS w/DC - continous dimming	0.60	0.65			
OS w /DC step dimming	0.65	0.70			
OS w/DC - ON/OFF	0.65	0.70			
No Change	1.00	1.00			

DC = Daylight controls (photosensor)

OC = Occupancy sensor

#### **Controls Codes**

- Adjusts usage per control type applied
- Occupancy (OS)
- Daylight (DC)
- OS/DC combination

<sup>-</sup> Apdapted from FEMP Publication "How to Select Lighting Controls for Offices and Public Buildings", December 2000 and from ASHRAE Standard 90.1-1989, Table 6-3



# **Space Description**

	Space Description							
Line Item	Building ID	Floor	Area Code		Additional Area Description	Percent contribution to demand charge (0-100%)	Conditioned Space (Y/N)	
1	3156	1	Private Office: 5 day		Rm 101	95%	Yes	
2	3156	2	Private Office: 6/7 day		Rm 201	95%	Yes	
3	3156	2	Open Office: 5 day			100%	Yes	
4	3156	2	Restroom		Bathroom - mens	85%	Yes	
5	3156	2	Hallway/Common		Hallway west end	100%	Yes	
6	3156		Parking Garage		Garage	100%	No	
7	3156	3	Exit Sign		•		195	
8			Workstation: 5					
9			Mi/\-24/7	Us	sage Group Co	de		
	- Draws from Usage Group Table							

- Auto-populates additional data



# **Pre-retrofit Equipment Description**

	Pre-Retrofit <b>©</b> ondition									
Pre-Retrofit <sup>®</sup>	Pre-Retrofit Description 2	Pre-Wattage <sup>®</sup>	#®of⊞ixtures	#13bf13hon-op12 fixtures	Lighting¶evel (foot∏andles)	Existing®Control® Device® Description	Pre®perating® Hours <mark>코</mark>			
2x4TROF-T8	2'x4'lRecessed@rofferlw/(2)IF32@81lampsl&[1)ILPIElectronicBallast	32.4	1	0		None	2860			
2x4TROF-T8	2'x4'recessedTrofferrw/(2)r32T81ampsrsq1)11PTectronicBallast	32.4	2	0		None	2860			
I1Gx90W	Incandescent@loberFixture@v/(1)@0W@ncandescent@lobe@amp	90.7	3	0		None	3172			
I1Gx90W	Incandescent@loberFixture@v/(1)@0W@ncandescent@lobe@amp	90.7	4	0		None	2855			
I1Gx90W	Incandescent@loberFixture@v/(1)@0W@ncandescent@lobe@amp	90.7	5	1		OS	2855			

#### **Fixture Code**

- Draws from Master Equipment list (defined by ESCO)
- Auto-populates description, wattage data



# **Post-Retrofit Equipment Description**

	Post-Retrofit <b>©</b> ondition										
Post <b>:</b> Retrofit <b>:</b> Code	■Post-Retrofit®Description®	Post-?	#動作ixtures	Lighting Level (foot Et and les) (Gref ESNA Et ds)	Proposed? Control? Device? Description	#abfaControla Devicesanstalled	Controls <sup>2</sup> Power <sup>3</sup> Adjustment <sup>3</sup> Factor <sup>2</sup>	Post®perating® Hours® <sup>1,®</sup>			
RLRB-T8HEB	Relamp@and@reballast@vi[2)@F28T8@Lamps@L@1@/32@LP@High@ff@Ballast	28.0	1		OS	1	0.75	2145			
RLRB-T8HEB	Relamp@andreballast@vi[2)F28T8ILamps@l[12/32ILPIHighIEffBallast	28.0	2		OS	1	0.75	2145			
RL-CF23	Relamp®vith®23W®Compact®luorescent®amp	26.1	3		None		1	3172			
RL-CF23	Relamp®vith®23W©Compact®luorescent®amp	26.1	4		None		1	2855			
NoIChange	No Retrofit, Pexisting Pequipment I to Bremain In Bervice	90.7	5		No®Change		1	2855			

#### **Fixture Code**

Functions same as pre-retrofit + populates cost data

# **Lighting Controls**

 Auto adjusts operating hours



# Savings (line item + totals) - kWh, KW, \$

Savings								
Energ	y - kWh	Deman	d - kW	Dollars - \$				
Lighting (kWh) Annual Savings	HVAC Interact. ( kWh) Annual Savings	Lighting (kW) Demand savings	HVAC Interactive (kW) Savings	kWh Annual Cost Savings	kW Demand Cost Savings	Total Annual Cost Savings (\$)		
310	3.04	0.11	0.04	29.71	13.50	\$43.21		
122	1.20	0.02	0.01	11.72	2.23	\$13.95		
58	0.57	0.01	0.00	5.61	1.17	\$6.79		
453	4.45	0.08	0.03	43.50	8.98	\$52.48		
3265	32.01	1.08	0.36	313.17	129.16	\$442.33		
878		0.10		83.44	11.13	\$94.57		
0						\$0.00		
68	0.66	0.03	0.01	6.48	3.10	\$9.58		
5154	42	1.43	0.44	493.63	169	\$662.90		



Costs								
Li	ghting <b>涯</b> quipme	nt	Con	trols				
Equipment  Material  Costs  (unit)	Equipment  Labor  costs  (unit)	Equipment  Disposal  (unit)	Control  Control  Device  Costs  Qunit)  Control  Costs  (unit)		Incidental <sup>®</sup> Costs <sup>®</sup> (total)	Total <b>©</b> osts		
\$14.50	\$1.00	\$0.00				\$15.50		
\$14.50	\$1.00	\$0.00	\$30.00	\$10.00	\$0.00	\$71.00		
\$7.40	\$0.00	\$0.00				\$22.20		
\$7.40	\$0.00	\$0.00	\$30.00	\$10.00	\$0.00	\$29.60		
\$0.00	\$0.00	\$0.00	\$30.00	\$10.00	\$0.00	\$0.00		

**Direct Costs (line item + category totals)** 

• Lighting/Controls: Material, labor, incidental



### **Audit Tool - Water**

- Room-by-room audit tool of plumbing fixtures
- Calculates water and cost savings with embedded formulas comparing baseline and proposed conditions
  - Current fixture (gpm/gpf), Usage (per person), water/sewer cost (\$)
  - Proposed fixture (gpm/gpf), Usage (per person), water/sewer cost (\$)
    - Also takes into account hot water heating savings
- Auto-populates tables for proposals/M&V plan



## **Audit Tool: HVAC Controls**

- Utilizes building simulation (EnergyPlus) to calculate energy and cost savings through comparison of baseline and proposed conditions
- ESCO enters building, HVAC system and controls parameters into tool via Excel interface
- Operating in the background, Energy Plus run simultaneous simulation of pre/post conditions and returns data to Excel sheet, where savings are auto-calculated

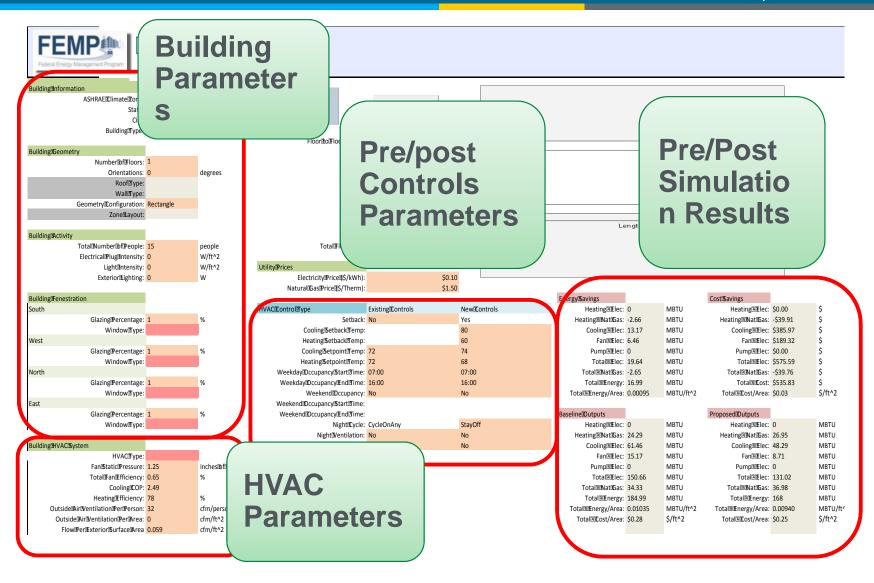


## **Audit Tool: HVAC Controls**

- Auto-populates tables for proposals/M&V
- Energy Plus is an energy analysis and thermal load simulation program (developed with DOE funding, free to the public) and is bundled in the FEMP toolset with all necessary operating files



#### **FEMP First Thursday Seminars**





# **Audit Tool Outputs**

# FEMP audit tool auto-generates several outputs for use in contractual documentation

- Savings Summary Tables
- Retrofit Equipment Summary Tables
  - Fixture summaries, Bill of Materials
- Task Order Schedule 4 (TO-4)

Input Processing Output



IGA and Award

## **Final Proposal**

- ECMs proposed: Utilizes outputs from FEMP audit tool to outline IGA findings
- M&V plan: Utilizes FEMP provided template
- Price Proposal: Task Order Schedules 1 5
   (TO-4 from FEMP audit tool)

## Statement of Work (SOW)

Utilizes FEMP provided template



# IGA and Award

- Following the Investment Grade Audit (IGA), the ESCO presents final proposal including the audit findings, final price, savings guarantees (presented in the FEMP Excel-based tool)
- This information is presented prior to final negotiations



# **Final Negotiations and Award**

- Agency and ESCO reach agreement on price and Scope of Work
- Following final negotiations the agency issues the Task Order to the contractor for implementation of the project







Installation

#### Activities: Estimated timeline - ~ 6 Weeks

- Installation
- Measurement and Verification (M&V)\*
- Commissioning\*
- Agency Acceptance\*



<sup>\*</sup> Indicates FEMP provided plan templates and report outlines



Installation

- ESCO implements measures per SOW and approved project plan ESCO provides agency advanced notice of completion and submits request for inspection.
- Agency schedules time of inspection with ESCO







Installation

- Final Inspections and Commissioning
  - According to Commissioning Plan\*
- Post Installation M&V
  - According to M&V Plan\*
- ESCO Deliverable: Post Installation report\*
  - Includes both Commissioning and Post Installation M&V results
- Project Acceptance

<sup>\*</sup> Indicates FEMP provided plan templates and report outlines



# Prescribed Measurement and Verification (M&V) Process

**Purpose:** Quantify the savings of the installed equipment **ENABLE Approach:** 

- FEMP has established an M&V plan template for use by the contractor
- The plan prescribes sampling, measurement and reporting protocol for each ECM
- Protocol utilized during ECM acceptance and annual M&V



# **Prescribed Commissioning (Cx)**

**Purpose:** Ensures equipment functions according to the

design intent and saves energy

## **ENABLE Approach:**

- FEMP has established a commissioning plan template for use by the contractor
- Cx plan prescribes contractor framework for Cx approach and execution of Cx activities and reporting

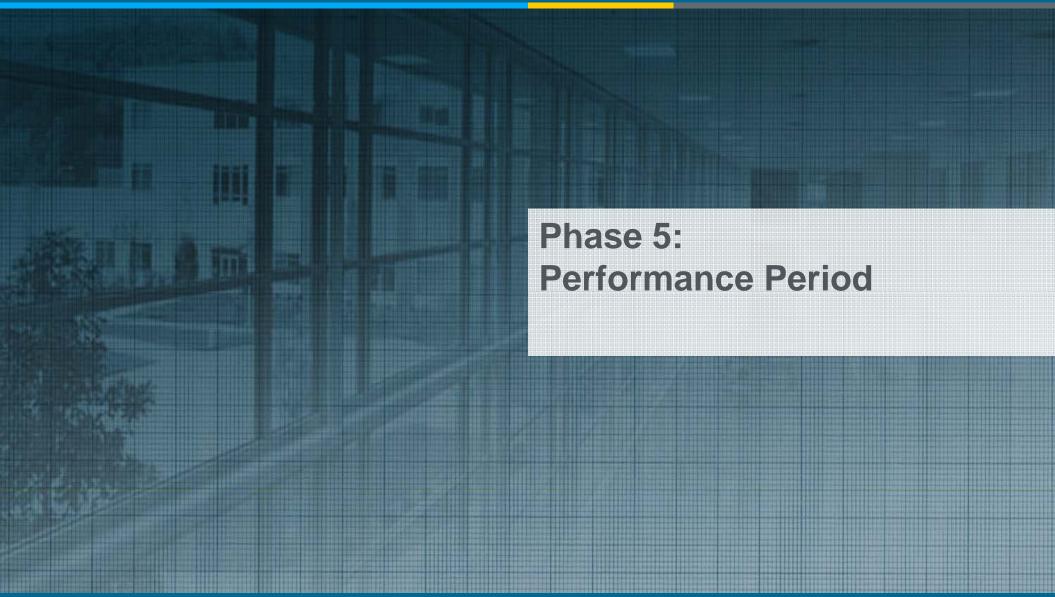


# **Final Project Acceptance**

FEMP guidance and checklists for project acceptance:

- Outlines post-installation activities
- Provides checklist for acceptance of a completed project
  - Example: Agency witnessing of M&V, approval of individual ECMs, approval of Cx and post-install reports





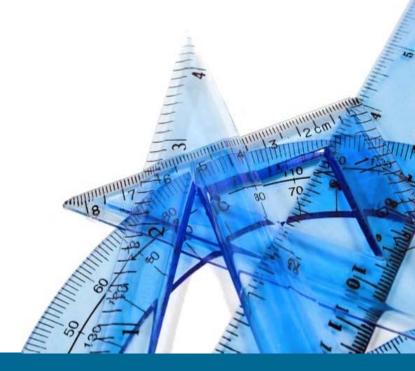


Performance Period

# Activity estimated timeline: Annually (for the life of the contract)

 Annual measurement and verification (M&V) audit\*

\*Indicates FEMP-provided template





Performance Period An annual M&V audit performed to verify the achievement of annual cost savings performance guarantees provided by the ESCO

- ESCO or agency must perform annual audit
- Equipment inspections are performed as prescribed in the M&V plan to verify savings achievement
- An annual M&V Report\* is to be generated by the ESCO and submitted to the agency

<sup>\*</sup> Indicates FEMP provided report outline



### **ENABLE: Technical Assistance**

- FEMP provides technical assistance during pilot phase and offer staff with Federal procurement, project facilitation, and project management experience at no cost to the agency
- GSA provides contracting assistance to all agencies using the GSA schedule





# **ENABLE: Training Opportunities**

FEMP Training <a href="https://www.femp.energy.gov/training">www.femp.energy.gov/training</a>

**GovEnergy 2012** 

August 19-22, 2012 (Project Financing Track)

**ENABLE ESCO Boot Camp** 

(in conjunction with GovEnergy) on Sunday, August 19, 2012





## **Getting Started: Agency Steps for Success**

- Identify sites that fit the size and scope of ESPC ENABLE initiative (<200,000 sq. ft., 3-ECMs, simplified M&V)</li>
- Attain buy-in from facility personnel, contracting officers, and any senior HQ officials that are required to sign-off
- Identify internal forms, procedures, or agency-specific requirements
- Assemble acquisition team to initiate project(s)

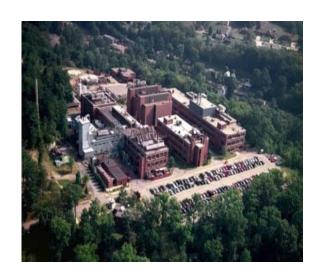


## **ESPC ENABLE: Pilot Projects**

- FEMP is actively pursuing sites for pilot projects
- Agencies interested in pursuing a pilot project(s) may contact:

## Ben Engleman

Contractor to FEMP
202-406-4110
BEngleman@energetics.com





## Conclusion

## **ESPC ENABLE Program Overview**

ESPC ENABLE is tailored for small Federal facilities to implement straight-forward ECMs – lighting, water, and HVAC controls – in a standardized and expedited manner





## Conclusion

## **ENABLE Program Benefits**

- Standardized and streamlined process
- Extensive technical assistance
- Energy savings realized in a short period of time
- M&V appropriate for project size and scope



#### **Contacts**

#### **Chip Goyette**

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